New avian records along the elevational gradient of Mt. Wilhelm, Papua New Guinea

by Katerina Sam & Bonny Koane

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Summary.—The north slopes of Mt. Wilhelm, the highest peak in Papua New Guinea, support a complete elevational gradient of relatively undisturbed rainforest, from 200 m to the tree line at 3,700 m. Based on field work in 2010 and 2012 over the Mt. Wilhelm elevational gradient, we report novel distribution data for 43 species, including geographic and elevational range extensions, demographic data, and new records of species poorly known in New Guinea.

The island of New Guinea has a complex geological and tectonic history (Hall 2002) that has impacted modern biogeographic patterns in the island's flora and fauna (e.g. Heads 2002, Deiner *et al.* 2011). Although birds are globally well known taxonomically, field work in New Guinea continues to uncover taxa new to science and complex biogeographic patterns (Diamond 1985, Mayr & Diamond 2001, Beehler *et al.* 2007, Beehler & Prawiradilaga 2010).

The island is divided into southern and northern watersheds by the Central Range (Diamond 1985), whose uplift is estimated to have commenced *c.*4–5 MYA (Pigram & Symonds 1991). Most of the Central Range is ornithologically poorly known. The highest peak in Papua New Guinea, Mt. Wilhelm (4,509 m), is near the centre of the Bismarck Range, which forms part of the northern Central Range. From its summit, the northern slopes fall steeply to the Ramu Valley at 50 m. The slopes of Mt. Wilhelm thus support the full suite of elevational zones, with a large region above the tree line. Mt. Wilhelm experiences high annual precipitation, especially its northern slopes, from 4,660 mm at 1,200 m to *c.*3,000–3,400 mm on the summit ridge at 4,450 m; the northern slopes are more consistently cloud-covered than those in the south and east (Hope 1976). Northern slopes of Mt. Wilhelm support relatively pristine forest, being disturbed only in close proximity to larger villages. In consequence, Mt. Wilhelm is of considerable ornithological interest, given a complete elevational gradient supporting relatively undisturbed forest and a highly diverse avifauna.

Diamond's (1972) monograph, describing the avifauna of the broader region around Mt. Wilhelm, arbitrarily defined the 'Eastern Highlands' as the area between Tari in the west to Kainantu in the east, and from the Schrader Range in the north to Lake Kutubu and Mt. Kirimui in the south. Thus it includes, but is larger than, the political subdivision of Papua New Guinea of the same name. The first systematic collections in this region were made in the early 1950s in the Wahgi Valley and environs (Mayr & Gilliard 1954, Gyldenstolpe 1955). The Schrader Range was surveyed by Stresemann in 1923 (*cf.* Diamond 1972) and by Gilliard & LeCroy (1968), Mt. Giluwe and Lake Kutubu by Schodde & Hitchcock (1968), and the Kubor Range by Hitchcock (1964). Bulmer (1962, 1967) made extensive observations in the Kaironk Valley (Schrader Range) and Kyaka area from the Baiyer River to the northern slopes of Mt. Hagen. Diamond undertook four expeditions (1964–66, 1969) to the south-eastern part of the Eastern Highlands (Diamond 1972).

To our knowledge, there has been no detailed ornithological survey of the north-east slopes of Mt. Wilhelm. The region surveyed by us is delimited by the Wahgi Valley in the north, the Kyaka area in the east, and the area surveyed by Diamond in the west. Usually,

only the uppermost elevations are visited by keen birdwatchers, whereas the lower valleys from Kegesugl to Bundi and Brahmin stations are very poorly surveyed due to difficulties of access. In 2010 and 2012, we conducted ornithological surveys with the aim of surveying the avifauna of the entire elevational gradient (see Table 2 for survey dates). Here, we report range extensions and other noteworthy observations made during our field work.

Methods

The study was conducted on the north-east slopes of Mt. Wilhelm (4,509 m) in the northern watershed of the Central Range in Madang and Chimbu provinces (Fig. 1). The forest transect spanned 30 km from the lowland floodplain of the Ramu River (200 m; 05°44'S, 145°20'E) to the treeline (3,700 m; 05°47'S, 145°03'E). The surveyed region (hereafter the region) is in the Bismarck Range and includes: the valleys of Lake Aunde and Piunde, Gwaki and Goe Creeks (to the uppermost Inbrum River in the north), the area between Kegesugl village, Bruno Sawmill and Sinopass (bounded by the range encompassing Bunoni station on its southern slopes, and by the Inbrum River in the north), Bundi station, Bundi station airport (bounded by the Ua River in the south-east), and the Inbrum River valley between Bundi station and Wau (near Brahmin airport). A detailed map is available at: http://tvardikova.weebly.com/uploads/3/8/5/6/3856833/ramu_teriotry_map.jpg.

Quantitative surveys were completed at eight sites (Table 1) evenly spaced at 500-m elevational intervals. Birds were surveyed using three standardised methods at each site—point counts, mist-netting and quantitative area counts—over three surveys in 2010 and 2012 (Table 2). Incidental observations were also recorded at camps and along trails between camps.

Point counts were undertaken at 16 sites over a 2,250-m transect (successive points were 150 ± 5 m apart; one transect per elevational site). Transects were directed at representative and diverse microhabitats within the area (e.g. ridges, valleys, creeks; ≥ 150 m from forest edge) and ± 50 m elevational change was permitted. All birds seen or heard within a radius of 50 m were recorded. Each count lasted 15 minutes, with all 16 points being surveyed prior to 11.00 h. To minimise double-counting, we aimed to accurately track moving birds, and we recorded additional individuals of the same species only if vocalising simultaneously and / or from an obviously different direction within a short time. Each transect (of 16

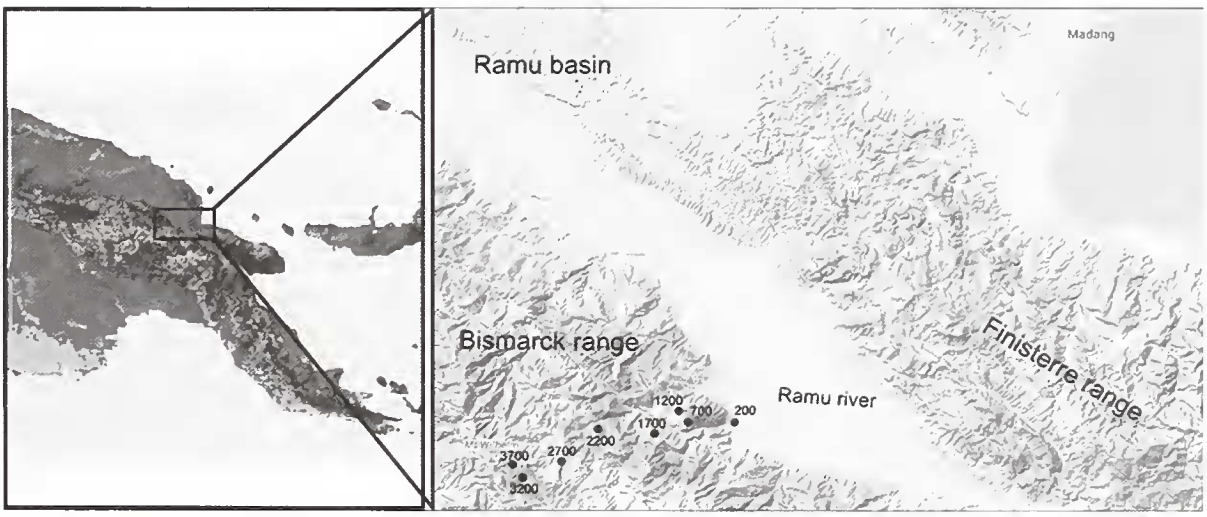

Figure 1. Map of Papua New Guinea showing the location of the Mt. Wilhelm and the elevational gradient that we studied.

TABLE 1
Location of study sites along the Mt. Wilhelm altitudinal gradient surveyed in 2010 and 2012.

Site name	Elevation (m)	Latitude	Longitude
Kausi	200	05°44′33″S	145°20′01″E
Numba	700	05°44′14″S	145°16′12″E
Memeku	1,200	05°43′18″S	145°16′17″E
Bananumbu	1,700	05°45′21″S	145°14′11″E
Sinopass	2,100	05°45′34″S	145°10′49″E
Bruno Sawmill	2,700	05°48′57″S	145°09′02″E
Kombuno Mambuno	3,200	05°48′18″S	145°04′20″E
Lake Aunde	3,700	05°47′10″S	145°03′32″E

TABLE 2
Summary of surveys and methodology used along the Mt. Wilhelm elevational gradient. Each replication of point counts comprised surveys at 16 points evenly spaced over the 2,250-m transect, with mist-netting conducted for 12 hours / day, and each replication of a quantitative area count represents a 2–3-hour survey. The third survey was split into two parts.

Survey number	1	2	3	
Start of survey	9 Apr 2010	26 Jul 2010	15 May 2012	1 Aug 2012
End of survey	31 May 2010	15 Oct 2010	15 Jul 2012	15 Oct 2012
Point counts	three replications	six replications	five replications	
Mist-netting	three days	five days	three days	
Quantitative area counts	three replications	six replications	N.A.	

points) was surveyed 14 times, resulting in 56 hours of data along each transect (i.e. each elevation). In total, we completed 1,792 point counts representing 448 hours.

We mist-netted birds along a 200 m-line of nets placed end to end (each net 2.5 m high × 12–18 m long, mesh 16 mm), from 05.30 h to 17.30 h daily, for 11 days at each site. On the first three days, the nets were placed between the first three points of the point count transect, then transferred to the last three points for the next three days of mist-netting, whenever possible (see Table 2). We identified all mist-netted birds, marked them individually with colour rings and released them within ten minutes. All recaptured birds were identified from colour ring combinations.

Area counts commenced at 15.00 h and lasted until 17.00 h or 18.00 h, during which we randomly walked (*c*.2 km^{-h}) the surrounding area (*c*.80 ha) recording all birds seen or heard. All species recorded during our expeditions are listed in Appendix 1. Photographs, sound-recordings and observation data are deposited online (e.g. Global Biodiversity Information Facility, www.xeno-canto.org (XC), and New Guinea Birds Online: pngbirds.myspecies.info). We used a Marantz PMD 620 digital recorder and Sennheiser ME67 microphone to record vocalisations. We follow IOC World Bird List (version 4.1.; www.worldbirdnames.org/) species-level taxonomy and nomenclature.

In total, our dataset for each site included 14 replications of point count surveys, 11 mist-netting days and 20 hours of quantitative area counts. The point counts and quantitative area counts were performed by both authors and by S. Jeppy, in teams of two with rotating membership. Mist-netting was performed by the authors with help of local villagers.

Results

We recorded 260 species at eight elevational sites (and from trails between them) on Mt. Wilhelm, mist-netted 1,490 birds and censused >34,000 individual birds during the three field surveys. Here we report novel distributional data for 43 species, including range extensions (for at least five species), new elevational ranges (at least 18 species), demographic data and records of species poorly known in New Guinea. We also provide a complete list of species recorded with their observed elevational ranges (Appendix 1).

SALVADORI'S TEAL *Salvadorina waigiuensis*
Endemic to montane New Guinea, rare and local at lower elevations but occurs across the island in suitable habitat. Previously unknown above 4,100 m (Coates & Peckover 2001), we observed two at a small waterbody at 4,300 m on five occasions in April and July 2010.

GREAT-BILLED HERON *Ardea sumatrana*
Scarce resident throughout New Guinea's lowlands, with one record at 550 m (Coates 1985). Mainly in coastal areas, but reported to occasionally follow rivers inland. Previously unreported from the middle Ramu River (but expected to occur in Sepik–Ramu River region: BirdLife International 2013a), we observed it at *c.*300 m on the river near Brahmin station, representing a south-easterly range extension.

FOREST BITTERN *Zonerodius heliosylus*
Occurs at 100–300 m, occasionally to 1,430 m (Coates 1985) or 1,450 m (Beehler *et al.* 1986). Three records of singles at *c.*1,600–1,650 m, near Bundi Station, apparently south of the known range (Martínez-Vilalta & Motis 1992), although the relative lack of recent records compromises efforts to accurately delineate the species' distribution. Those we observed were under the cover of shrubs at the river edge, once in swampy vegetation. One that flushed perched on a tree *c.*3 m high. Observed to take a lizard and twice small fish.

BLACK-WINGED KITE *Elanus caeruleus*
Twice observed in mid-August 2012 above shrub and grassland habitat below Lake Piunde (at 3,200–3,600 m), which is higher than previously reported for New Guinea (2,300 m: Beehler *et al.* 1986; 1,830 m: Coates 1985).

BLACK-MANTLED GOSHAWK *Accipiter melanochlamys*
Previously unrecorded above 3,000 m (Coates & Peckover 2001). We observed it regularly at *c.*3,200 m and 3,500 m below Lake Piunde (*c.*05°47'45"S, 145°03'53"E) in 2010 and 2012.

MEYER'S GOSHAWK *Accipiter meyerianus*
Regularly observed in May 2010, August 2010 and August 2012 at 1,700–2,200 m, always in forest interior along rivers. Never observed soaring or gliding. Pairs repeatedly encountered on exposed branches of tall trees at 2,200 m, and observed hunting for large lizards on a tree at 1,700 m and for a large honeyeater in the canopy at 2,200 m. Ours are possibly the first records of this uncommon species in the Bismarck Range (Ferguson-Lees & Christie 2001), although it is expected to occur throughout the eastern Central Range.

FORBES'S FOREST RAIL *Rallicula forbesi*
Previously recorded at 1,000–3,000 m (Coates & Peckover 2001). We found it to be quite common between 2,200 m (six records) and 3,200 m (five), especially at 2,700 m (seven seen,

three heard) where we mist-netted two individuals. We observed a pair near their roost on three consecutive days at 2,700 m, foraging on the forest floor in the morning.

BARE-EYED RAIL *Gymnocrex plumbeiventris*
Previously reported from sea level to 1,200 m (Beehler *et al.* 1986), max. 1,600 m in east New Guinea (Taylor 1996). We observed one foraging in a grassy area beside a river at 1,400 m on 20 September 2012. Local people informed us that the species occurs in this area year-round.

NEW GUINEA WOODCOCK *Scolopax saturata*
Recorded at 1,500–3,000 m (Beehler *et al.* 1986) even up to 3,800 m (Coates 1985). Our two observations at 2,700 m are from a region lacking previous records, although the species was expected to occur (Beehler *et al.* 1986). One was observed foraging in dense understorey near our camp in primary forest at *c.*20.00 h. What was presumably another was seen *c.*1.5 km away in dense vegetation at dawn.

METALLIC PIGEON *Columba vitiensis*
Regularly observed (12 records of at least seven birds on six days) at 2,700 m in 2010, rarely ($n = 2$) in 2012; less common (four in six days) at 2,200 m. Peckover & Filewood (1976) mist-netted one at 2,700 m, whilst Mayr (1941) considered it a lowland species found below 1,400 m. We did not encounter it at lower elevations. Two sound-recorded at 2,700 m (XC165214; pngbirds.myspecies.info/species/columba-vitiensis). Observed alone, in pairs or groups of three, usually on very tall emergents, although one was perched *c.*4 m above ground, just before dusk, near our camp at 2,200 m.

SLENDER-BILLED CUCKOO-DOVE *Macropygia amboinensis* / **BAR-TAILED CUCKOO-DOVE** *M. nigrirostris*
M. amboinensis occurs in mainland New Guinea from sea level to 1,800 m, locally to 2,100 m (Beehler *et al.* 1986). We found it to be very common (5–7 birds per day) at all elevations 200–2,200 m, and similarly abundant throughout, albeit slightly more numerous at 200 m. *M. nigrirostris* is also well known in the region, and expected from sea level to 2,600 m (Beehler *et al.* 1986). However, we found it only at 2,700 m, never at lower elevations.

THICK-BILLED GROUND PIGEON *Trugon terrestris*
Inhabits rainforest and monsoon forest in lowlands and hills below 640 m (Baptista *et al.* 1997, Coates & Peckover 2001). Villagers killed one at *c.*1,100 m and brought it to our camp at 1,200 m in July 2010. Observed regularly only at our 700 m site.

PHEASANT PIGEON *Otidiphaps nobilis*
We observed what was presumably the same bird (in the same tree) at 2,600 m on 15–17 August 2012, with another at 1,700 m in 2010 and three at 2,200 m in 2010 and 2012. Our observations are higher than previously reported (to 1,900 m; Beehler *et al.* 1986, and heard at 2,050 m on Huon Peninsula; Freeman *et al.* 2013).

CORONETED FRUIT DOVE *Ptilinopus coronulatus quadrigeminus*
Previously known to 1,200 m (Beehler *et al.* 1986), but we recorded it at 200–1,700 m.

ORNATE FRUIT DOVE *Ptilinopus ornatus*
Found primarily at 200–1,350 m, but apparently nomadic up to 2,500 m (Beehler *et al.* 1986). We observed a flock of five in the canopy of a fig tree, one perched at dusk *c.*2 m above

ground in a tree near our camp at 2,200 m, and we disturbed another two in a fig tree at 2,200 m in 2010. Interestingly, we did not record it at lower elevations.

PESQUET'S PARROT *Psittrichas fulgidus*
Threatened by hunting; recorded to 2,000 m in Central Range (Beehler *et al.* 1986) and at 600–2,420 on the Huon Peninsula (Freeman *et al.* 2013). Just one observation involving two birds at 2,200 m. Usually reported as rare and in small numbers, with recent rapid declines recorded locally (BirdLife International 2013b).

PAPUAN KING PARROT *Alisterus chloropterus*
Reported to be mainly a hill forest species ranging from sea level to 2,300 m, occasionally to 2,600 m (Coates 1985). We made 100 records at 2,700 m and 128 records at 2,200 m, while it was less abundant at 700 m and 1,700 m (two and three observations, respectively), and we did not encounter it at 200 m. Our other surveys in the Madang lowlands found the species to be quite abundant at 50–250 m.

DUSKY LORY *Pseudeos fuscata*
Common at 2,200–2,700 m, and also present at 200 m and 1,700 m. Previously reported only to 2,400 m (Beehler *et al.* 1986, Collar 1997).

PYGMY LORIKEET *Charmosyna wilhelminae*
Uncommon, possibly overlooked (Beehler *et al.* 1986), in montane forest, mainly at 1,000–2,200 m (Collar 1997). Also descends to lowlands, even to sea level. Surprisingly, most of our records were at 1,200 m ($n = 43$) with many fewer ($n = 19$) at 700 m, lower than expected.

RED-FRONTED LORIKEET *Charmosyna rubronotata*
Reported by Coates (1985) at 0–850 m, from the Vogelkop east to the Ramu River in Madang province, whereas Collar (1997) listed it only from Vogelkop east to the Adelbert Mountains on mainland New Guinea. We observed it at 200 m, at least 60 km up the Ramu River from the range in Coates (1985) and at least 150 km from that reported by Collar (1997). Identification was based on the distinct red forehead and blue ear-coverts, not blue ear-coverts and red lores, cheeks and upper throat like Red-flanked Lorikeet *C. placentis*. Never observed in flocks with *C. placentis* but once with Black-capped Lory *Lorius lory*. We mostly observed *C. placentis* at 700 m (17 records), rarely at 200 m (five), while we recorded eight *C. rubronotata* at 200 m (two flocks on separate surveys). Photographed and sound-recorded (XC164011; pngbirds.myspecies.info/species/charmosyna-rubronotata).

CHESTNUT-BREASTED CUCKOO *Cacomantis castaneiventris* / **FAN-TAILED CUCKOO** *C. flabelliformis*
We observed *C. castaneiventris* at 200–1,200 m and *C. flabelliformis* at 1,200–3,700 m, within their known ranges. Surprisingly, we mist-netted them in syntopy at 1,200 m. In the hand, *C. castaneiventris* is smaller and more richly coloured than *C. flabelliformis*. *C. castaneiventris* has the head-sides and chin dark bluish grey, throat rich chestnut and bill black, whereas *C. flabelliformis* has the head-sides and chin grey with a greenish sheen, throat grey and bill blackish brown. The whistled trill of *C. castaneiventris* is *c.*2 times shorter (and slightly faster) than that of *C. flabelliformis*. *C. castaneiventris* also produces a slow-paced phrase of three mournful notes (*seei-to-saai*) resembling Brush Cuckoo *C. variolosus* (but slower and on an even pitch). Mournful-sounding *C. flabelliformis* has only two notes (*pee-wee*; slow and the second note higher pitched).

BARKING OWL *Ninox connivens*
Commonly heard around Bundi village at *c.*1,500 m. Elevational range on New Guinea unknown, but our observation is higher than all available records from the mainland (up to 500 m), although reported at 1,040 m on Karkar Island (Diamond & LeCroy 1979).

MARBLED FROGMOUTH *Podargus ocellatus*
Mainly in the lowlands, but recorded to 1,500 m on New Guinea (Holyoak 1999, Coates & Peckover 2001). We mist-netted and photographed the species at 1,200 m and 1,700 m, and sound-recorded it at 2,200 m (XC 164007; pngbirds.myspecies.info/species/podargus-ocellatus).

PACIFIC SWIFT *Apus pacificus*
Rare winter visitor to New Guinea, recorded principally in southern New Guinea in October–March (Beehler *et al.* 1986). Coates (1985) mentioned a record from the Huon coast (Wasu Station) in mid November, with another observation on the Huon Peninsula in July (Freeman *et al.* 2013). We recorded it in April and late May 2010 at 200 m and mid June until early July 2012 at the same elevation, suggesting that some (perhaps younger) birds over-summer on New Guinea.

MOUNTAIN KINGFISHER *Syma megarhyncha* / **YELLOW-BILLED KINGFISHER** *S. torotoro*
S. torotoro is common to fairly common in lowlands, mostly below 500 m, locally to 1,100 m (Coates 1985); *S. megarhyncha* occurs at 700–2,200 m (Beehler *et al.* 1986) or 760–2,200 m (Coates 1985). The transition zone in Chimbu province is at 1,100–1,340 m (Diamond 1972). We observed *S. torotoro* only at 200 m and 700 m, and did not record *S. megarhyncha* below 2,200 m, with the highest at 2,700 m (sound-recorded) and one at *c.*2,600 m. Given the difficulty of observing of *Syma* kingfishers in the field and separating the two species' vocalisations, further work is needed to elucidate their true elevational ranges.

RAINBOW BEE-EATER *Merops ornatus*
Widespread throughout New Guinea and Australia, with Australian birds mainly wintering in New Guinea, where migrants are present early March to early October. Present in smaller numbers during the rest of the year in the Port Moresby area where it breeds. Also said to breed in the Sepik–Ramu River Region. The very similar Blue-tailed Bee-eater *M. philippinus* breeds locally throughout New Guinea. We recorded *M. philippinus* at our study sites near Madang town, but not on Mt. Wilhelm. All those observed at our 200 m site had yellow-orange (not greenish) foreheads and a broad black eyestripe bordered narrowly by blue (not white) above, confirming their identity as *M. ornatus*. Observed during all surveys (9 April–15 October 2010) with a few breeding pairs in September 2012, in burrows in flat sandy soil along the Ua River.

PAPUAN TREECREEPER *Cormobates placens*
Widespread in the Central Range but apparently absent from central-eastern New Guinea (Diamond 1972). *C. p. steini* occurs in west and central New Guinea in the Weyland Mountains east through the Hindenburg Range to Tari Gap, with *C. p. meridionalis* in south-east New Guinea east from the Aseki area, Mt. Kaindi and Herzog Mountains (Coates 1990, Noske 2007). Occurs at 1,250–2,600 m (or 3,000 m in Snow Mountains: Coates 1990). Our observation refutes Diamond's contention as to the absence of *C. placens* in this part of the Central Range. We recorded it at 2,630 m, outside its known range, but were unable

to identify the subspecies, observing three individuals (two on 25 April and one on 27 April 2010) bark-climbing and searching for food on dry branches and the trunk of a tall tree (*c.*10–15 m above ground). The singleton was with a group of five Large Scrubwrens *Sericornis nouhuysi* and two Friendly Fantails *Rhipidura alboliubata*. Sound-recorded (XC165217; pngbirds.myspecies.info/species/cormobates-placens).

MOUNTAIN HONEYEATER *Meliphaga orientalis*
Occurs mostly at lower and mid elevations, *c.*550–2,100 m, and is the only *Meliphaga* common (or present) above 1,400 m (Beehler *et al.* 1986). We mist-netted it frequently at 1,700–2,700 m ($n = 7$; pngbirds.myspecies.info/species/meliphaga-orientalis).

LONG-BEARDED MELIDECTES *Melidectes princeps*
Endemic to a few valleys on Mt. Giluwe, Mt. Hagen and the Kubor Range, mainly at 3,000–3,800 m (Higgins *et al.* 2008) but recently recorded to 4,200 m and extends to 2,750 m (Coates & Peckover 2001). On Mt. Wilhelm, previously reported mainly above 3,050 m (Coates & Peckover 2001, Higgins *et al.* 2008). Very abundant at 3,200–3,700 m, but none found in denser forest at lower elevations, and the species seems to prefer scattered trees at the tree line. Albeit restricted to small areas (on Mt. Wilhelm *c.*200 ha), it is one of the commonest species in the valley of Lakes Piunde and Aunde.

YELLOWISH-STREAKED HONEYEATER *Ptiloprora meekiana*
Resident of Saruwaged Mountains (Huon Peninsula), Herzog Mountains, the upper Mambare Range and Mt. Tafa-Efogi (Higgins *et al.* 2008). We provide the first record for Mt. Wilhelm, where two were observed foraging in a flowering tree at *c.*2,500 m in May 2012. The species is thought to be nomadic, which fits our lone observation. Call is an easily overlooked *chip* or *ship*.

BICOLOURED MOUSE-WARBLER *Crateroscelis nigrorufa*
Patchily distributed throughout foothill forest of New Guinea, with a very restricted elevational range (Beehler *et al.* 1986). We found it to be quite abundant (2–4 records / 12.6 ha) at 1,700 m, and even commoner at 1,770–1,790 m (but we did not conduct standardised surveys there). The local abundance of this species is surprising, given that just 38 specimens are listed in the ORNIS database (Freeman *et al.* 2013).

BUFF-FACED SCRUBWREN *Sericornis perspicillatus* / **PAPUAN SCRUBWREN** *S. papuensis*
These species differ markedly in their vocalisations and are easily separated if singing. In the hand, local *S. papuensis* has a dark subterminal tail-band (95%, $n = 64$) and a brownish-buff crown and forehead, while *S. perspicillatus* has a grey crown and no subterminal tail-band at least in individuals examined by KS (*c.*70%, $n = 73$). *S. perspicillatus* was very numerous at 1,700–2,200 m with abundance decreasing to 2,700 m, whilst *S. papuensis* appeared at 1,700 m and became more abundant towards its upper range limits at 3,200 m. They overlap broadly at *c.*1,700–2,700 m. Diamond (1972) previously suggested that the presence or lack of a subterminal tail-band is helpful in their separation, confirmed by Freeman *et al.* (2013) and by our data. We disagree with Gregory (2007), who stated that Buff-faced Scrubwren also has a dark subterminal tail-band.

STOUT-BILLED CUCKOOSHRIKE *Coracina caeruleogrisea*
On New Guinea, known mainly in lowlands, hill forest and lower montane regions, from sea level to 1,700 m, rarely 2,450 m (Beehler *et al.* 1986, Taylor 2005). Recorded also at Tari Gap at 2,500 m in 1990 (N. P. Dreyer pers. comm.). We observed four regularly at 2,700 m in September 2012, frequently heard its distinctive voice at all sites 700–2,700 m, and mist-netted a male at 2,200 m.

YELLOW-BREASTED SATINBIRD *Loboparadisea sericea*
We mist-netted a male on 16 June 2012 at 1,700 m, and observed the species three times near our mist-nets (presumably the same male twice, and a female). Once we heard three harsh *sssh* notes, louder than those of Superb Bird-of-paradise *Lophorina superba*, which was abundant at this elevation. The male was observed feeding on berries in the lower forest strata, the female berries and large insects.

GOLDEN CUCKOOSHRIKE *Campochaera sloetii*
Previously known only in the Arfak Mountains east to the Wewak area (Idenburg River and near Holland; *C. s. sloetii*) and the southern New Guinea lowlands from the River Mimika east to Moroka, and foothills of Owen Stanley Range (*C. s. flaviceps*; Rand & Gilliard 1967, Taylor 2005). Previously reported from sea level to 1,100 m (Coates 1990). We recorded it at 200 m and 1,200 m, but made just two sightings and never mist-netted the species, with most records vocal only. The vocalisation we heard was closer to available recordings of *C. s. flaviceps*, which would represent a northerly range extension, if confirmed. Our other surveys in the Madang lowlands confirmed the species to be a rare resident along the Ramu River.

BLACK SICKLEBILL *Epimachus fastuosus* / **BROWN SICKLEBILL** *E. meyeri*
Sicklebills occur in mid-montane primary forest, more rarely in adjacent second growth and garden edges. *E. fastuosus* was previously known at 1,280–2,550 m, mainly 1,800–2,150 m, and predominates at lower elevations over *E. meyeri*. The latter occurs in middle and upper montane forests at 1,500–3,200 m, mainly at 1,900–2,900 m. We suggest that they are not elevational replacements on Mt. Wilhelm, as their ranges overlap broadly: *E. fastuosus* was abundant at 2,200 and 2,700 m (n = 21 and 41, respectively) and rare at 1,200 and 1,700 m (n = 3 and 5, respectively); *E. meyeri* was most abundant at 2,700 m (n = 98), less numerous at 2,200 and 3,200 m (n = 45 and 48, respectively), and rare at 1,700 m (n = 2). We observed *E. fastuosus* higher than expected and *E. meyeri* within its previously described range.

NORTHERN VARIABLE PITOHUI *Pitohui kirhocephalus* / **HOODED PITOHUI** *P. dichrous*
These sister species (Dumbacher *et al.* 2008) appear to replace each other elevationally over most New Guinean ranges (Beehler *et al.* 1986). On Mt. Wilhelm, *P. kirhocephalus* occurs at lower elevations (200–1,200 m; n = 50/1, 68/2 and 54/2, seen + heard/mist-netted, respectively), with *P. dichrous* at higher elevations (700–1,700 m; n = 53/2, 231/5 and 105/1, respectively). On the other hand, their ranges are not strictly exclusive as at 700 m and 1,200 m, both were common in syntopy, and the species are possibly widely sympatric. The zone of transition is also much higher than in the Fakfak Mountains (*c.*950–980 m: Rheindt 2012).

Discussion

All of New Guinea is relatively unexplored ornithologically. Our comprehensive surveys along the elevational gradient of Mt. Wilhelm in 2010 and 2012 confirm this,

given that our work produced at least five additions to the regional avifauna (*Cormobates placens*, *Campochaera sloetii*, *Ptiloprora meekiana*, *Charmosyna rubronotata*, *Ardea sumatrana*, and possibly *Zonerodius heliosylus* and *Accipiter meyerianus*). Our observations of *Cormobates placens* are especially interesting as Diamond (1972) considered *C. placens* one of nine 'drop-out' species (i.e. those recorded from the Central Range to the east and west of the Eastern Highlands, but not in the Eastern Highlands despite suitable habitat). The range of *C. placens* was believed to be marked by a gap of *c.*400 km, but our observations confirm its presence there. Nevertheless, we did not record any of the other eight bird species assumed to be missing.

Two other species regularly found along the Ramu River and in the Madang lowlands were not observed: Northern Cassowary *Casuarius unappendiculatus* and Victoria Crowned Pigeon *Goura victoria*. These could be absent due to hunting pressure. Habitats at our 200 m site on the Mt. Wilhelm gradient were flat and swampy, and did not differ obviously from sites in the Madang lowlands where we encountered both species regularly (KS unpubl.). Nearby Brahmin mission (*c.*1.5 hours walk) is one of the largest villages in the region, and local people hunt the surrounding area heavily, perhaps including our study site. Hunting at our 200 m site might also explain the local absence of *Alisterus chloropterus*, which is expected to occur from sea level to 2,600 m, and our surveys of primary forest in the Madang lowlands confirmed it to be abundant there.

Competition between closely related species is believed to play an important role in avian community structure in New Guinea (Diamond 1973, 1986), which hypothesis is supported by distributional patterns of elevational replacements, i.e. closely related species (usually congeners) inhabiting the same habitat type but which possess largely or completely exclusive elevational ranges. However, our observations from Mt. Wilhelm do not support some of Diamond's (1972) conclusions concerning segregation by elevation. For most species-pairs mentioned in Diamond's work, we observed large gaps in their elevational ranges, e.g. Purple-tailed *Ducula rufigaster* (200 m) and Rufescent Imperial Pigeons *D. chalconata* (1,700–2,700 m), *Syma torotoro* (200–700 m) and *S. megarhyncha* (2,200–2,700 m) or Lowland *Peltops blainvillii* (200–700 m) and Mountain Peltops *P. montanus* (1,700–2,700 m). At least some of the apparent gaps between species-pairs might reflect our survey methodology, with field work at closer-spaced elevational sites necessary to confirm their true elevational ranges.

More surprisingly, we observed few sharp elevational transitions or complete mutual exclusions. Diamond (1972) regarded segregation of Rusty *Crateroscelis murina* and Mountain Mouse-warblers *C. robusta* as an example of abrupt elevational segregation. On Mt. Karimui, *C. murina* progressively increased in abundance with elevation until it abruptly disappeared at 1,643 m, to be replaced by *C. robusta* at 1,646 m (Diamond 1972). On Mt. Wilhelm, *C. murina* was present at 200–1,700 m and *C. robusta* at 1,200–3,700 m, with *C. nigrorufa* narrowly present at 1,700–1,790 m. Similarly, we did not confirm a sharp segregation for congeneric species of *Pitohui*, *Epimachus*, *Sericornis* (see main text), *Melanocharis*, *Rhipidura* and *Coracina* (*cf.* Appendix 1). Species from these genera overlapped in their elevational ranges (sometimes broadly).

Diamond (1973) illustrated the phenomenon of interspecific competition by comparing the elevational ranges of species of *Ptiloprora* in the Huon and Central Ranges. Rufous-backed Honeyeater *Ptiloprora guisei* is resident at *c.*1,700–2,500 m (2,900 m: Higgins *et al.* 2008) in the Central Ranges, replaced above 2,500 m by its close relative Grey-streaked Honeyeater *P. perstriata*. On the Huon Peninsula, where *P. perstriata* is absent, *P. guisei* expands its niche, to *c.*1,660–3,500 m. Surprisingly, we observed *P. guisei* at 1,700–3,200 m (n = 6, 11, 17 and 1 mist-netted, respectively), with *P. perstriata* at 2,200–3,700 m (n = 8, 39,

34 and 12 mist-netted, respectively). Our mist-netting data confirm that the two species overlap broadly, and both are most abundant at 2,200 m and 2,700 m, suggesting a lack of strong competition. *P. guisei* also appears to extend to higher elevations, without any obvious impact on *P. perstriata* (which was observed within its expected range).

We recorded many extensions to upper elevational ranges (≥ 18 species, or 7% of the total), which is especially surprising considering the elevational distance of 500 m between sites, resulting in significant under-estimation of limits at in-between elevations, and that we did not consider potential extensions of < 100 m as significant. However, our main caveat is the absence of historical data for Mt. Wilhelm. Baseline information on the abundance of species over elevational gradients is essential to determine shifts in elevation and their significance (Shoo *et al.* 2006). Ranges reported in the general literature may include mistakes, may lack precision or may be specific to another region. However, it seems unlikely that data on elevational ranges would systematically under-estimate only upper elevational limits.

Shifts in geographic ranges are frequent in temperate regions, where species may respond to climate warming by moving to higher latitudes or elevations. The few studies that have reported elevational range extensions for tropical birds (Pounds *et al.* 1999, Peh 2007) have relied on indirect evidence, derived from community changes in census plots (Pounds *et al.* 1999) or changes inferred from bird lists (Peh 2007). In accordance with a previous study (Forero-Medina *et al.* 2011), we found more elevational shifts for frugivorous birds (ten species) than insectivores (four), while range extensions comprised mainly non-passerines and frugivores. These groups comprise rather mobile species with larger home ranges and lower densities, while many frugivores may seasonally follow resources such as flowering or fruiting trees (Loiselle & Blake 1990). Nevertheless, the observed shifts were repeated across the three surveys, and we repeatedly observed several species higher than expected.

Our new data regarding avian distributions reveal that New Guinea continues to be an excellent theatre to study diversification, competition and community structure. Our new elevational records suggest that some species are expanding upslope in response to climate change. We recommend further biodiversity surveys in all of New Guinea's mountains, and continued monitoring to investigate species distributions in more detail.

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Addresses: Katerina Sam, Biology Centre AS CR, v.v.i., Institute of Entomology & Univ. of South Bohemia, Faculty of Science, Branisovska 31, 370 05 Ceske Budejovice, Czech Republic, e-mail: katerina.sam.cz@gmail.com. Bonny Koane, New Guinea Binatang Research Center, P.O. Box 604, Madang, Papua New Guinea.

Appendix 1

Recorded bird species and their observed elevational ranges. A single elevation is given if the species concerned was recorded at just one site. Continuous range is entered as lowest–highest, whilst elevational sites separated by commas indicate the species was not observed at all sites between the lowest and highest elevation. Species denoted * are discussed in the text.

English name	Scientific name	Observed range (m)
Dwarf Cassowary	*Casuarius bennetti*	2,700
Wattled Brushturkey	*Aepypodius arfakianus*	1,700
Collared Brushturkey	*Talegalla jobiensis*	1,200
New Guinea Scrubfowl	*Megapodius decollatus*	200–700
Salvadori's Teal	*Salvadorina waigiuensis*	4,300*
Pacific Black Duck	*Anas superciliosa*	3,500
Forest Bittern	*Zonerodius heliosylus*	1,600–1,650*
Great-billed Heron	*Ardea sumatrana*	300*
Black-winged Kite	*Elanus caeruleus*	3,200–3,600*
Long-tailed Honey Buzzard	*Henicopernis longicauda*	200–700
Grey Goshawk	*Accipiter novaehollandiae*	700
Black-mantled Goshawk	*Accipiter melanochlamys*	3,200–3,500*
Meyer's Goshawk	*Accipiter meyerianus*	1,700–2,200*
Black Kite	*Milvus migrans*	200–1,700
Whistling Kite	*Haliastur sphenurus*	200–700
Brahminy Kite	*Haliastur indus*	200–2200
Pygmy Eagle	*Hieraaetus weiskei*	1,700
Papuan Eagle	*Harpyopsis novaeguineae*	200–1,200, 2,200–3,200
Forbes's Forest Rail	*Rallicula forbesi*	2,200–3,200*
Bare-eyed Rail	*Gymnocrex plumbeiventris*	1,400*
New Guinea Woodcock	*Scolopax saturata*	2,700*
Metallic Pigeon	*Columba vitiensis*	2,700*
Slender-billed Cuckoo-Dove	*Macropygia amboinensis*	200–2,200*
Bar-tailed Cuckoo-Dove	*Macropygia nigrirostris*	2,700*
Great Cuckoo-Dove	*Reinwardtoena reinwardti*	200–3,200
Common Emerald Dove	*Chalcophaps indica*	200–700
Stephan's Emerald Dove	*Chalcophaps stephani*	200–1,200
New Guinea Bronzewing	*Henicophaps albifrons*	200–1,200
Thick-billed Ground Pigeon	*Trugon terrestris*	700–1,100*
White-breasted Ground Dove	*Gallicolumba jobiensis*	2,200
Bronze Ground Dove	*Gallicolumba beccarii*	1,200–1,700

Pheasant Pigeon	*Otidiphaps nobilis*	1,700–2,600*
Wompoo Fruit Dove	*Ptilinopus magnificus*	700–1,200
Pink-spotted Fruit Dove	*Ptilinopus perlatus*	200–700
Ornate Fruit Dove	*Ptilinopus ornatus*	2,200–2,700*
Superb Fruit Dove	*Ptilinopus superbus*	200–2,200
Coroneted Fruit Dove	*Ptilinopus coronulatus*	200–1,700*
Beautiful Fruit Dove	*Ptilinopus pulchellus*	200–1,200
White-bibbed Fruit Dove	*Ptilinopus rivoli*	1,700–3,200
Orange-bellied Fruit Dove	*Ptilinopus iozonus*	200
Purple-tailed Imperial Pigeon	*Ducula rufigaster*	200
Rufescent Imperial Pigeon	*Ducula chalconota*	1,700–2,700
Pinon's Imperial Pigeon	*Ducula pinon*	200
Zoe's Imperial Pigeon	*Ducula zoeae*	200–1,200
Papuan Mountain Pigeon	*Gymnophaps albertisii*	1,700–3,700
Palm Cockatoo	*Probosciger aterrimus*	200–1,200
Sulphur-crested Cockatoo	*Cacatua galerita*	200–1,200
Pesquet's Parrot	*Psittrichas fulgidus*	2,200*
Orange-fronted Hanging Parrot	*Loriculus aurantiifrons*	200
Buff-faced Pygmy Parrot	*Micropsitta pusio*	200–700
Red-breasted Pygmy Parrot	*Micropsitta bruijnii*	700–1,200
Dusky Lory	*Pseudeos fuscata*	200–2,700*
Coconut Lorikeet	*Trichoglossus haematodus*	200–1,200
Goldie's Lorikeet	*Psitteuteles goldiei*	2,700–3,200
Black-capped Lory	*Lorius lory*	200–1,200
Pygmy Lorikeet	*Charmosyna wilhelminae*	700–1,200*
Red-fronted Lorikeet	*Charmosyna rubronotata*	200*
Red-flanked Lorikeet	*Charmosyna placentis*	200–700
Papuan Lorikeet	*Charmosyna papou*	1,700–3,700
Plum-faced Lorikeet	*Oreopsittacus arfaki*	1,700–3,700
Yellow-billed Lorikeet	*Neopsittacus musschenbroekii*	1,200–3,200
Orange-billed Lorikeet	*Neopsittacus pullicauda*	1,700–3,700
Brehm's Tiger Parrot	*Psittacella brehmii*	2,200–2,700
Painted Tiger Parrot	*Psittacella picta*	2,700–3,700
Red-cheeked Parrot	*Geoffroyus geoffroyi*	200
Blue-collared Parrot	*Geoffroyus simplex*	700
Eclectus Parrot	*Eclectus roratus*	200–1,200
Papuan King Parrot	*Alisterus chloropterus*	700–2,700*
Orange-breasted Fig Parrot	*Cyclopsitta gulielmitertii*	200
Double-eyed Fig Parrot	*Cyclopsitta diophthalma*	200–1,700
Edwards's Fig Parrot	*Psittaculirostris edwardsii*	200–1,200
Pheasant-Coucal	*Centropus phasianinus*	200–700
Dwarf Koel	*Microdynamis parva*	200
Asian Koel	*Eudynamys scolopaceus*	200–1,200
Channel-billed Cuckoo	*Scythrops novaehollandiae*	200
Little Bronze Cuckoo	*Chrysococcyx minutillus*	200
Rufous-throated Bronze Cuckoo	*Chrysococcyx ruficollis*	2,700–3,200
Chestnut-breasted Cuckoo	*Cacomantis castaneiventris*	200–1,200*
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	1,200–3,700*
Brush Cuckoo	*Cacomantis variolosus*	200–1,700
White-crowned Cuckoo	*Cacomantis leucolophus*	200–1,200
Rufous Owl	*Ninox rufa*	1,700

Barking Owl	*Ninox connivens*	1,500*
Papuan Boobook	*Ninox theomacha*	200–2,200
Marbled Frogmouth	*Podargus ocellatus*	1,200–2,200*
Large-tailed Nightjar	*Caprimulgus macrurus*	200
Feline Owlet-Nightjar	*Euacgotheles insignis*	2,700
Mountain Owlet-Nightjar	*Aegotheles albertisi*	2,200
Glossy Swiftlet	*Collocalia esculenta*	200, 1,500–2,700
Mountain Swiftlet	*Aerodramus hirundinaceus*	3,700
Pacific Swift	*Apus pacificus*	200*
Oriental Dollarbird	*Eurystomus orientalis*	200–700
Hook-billed Kingfisher	*Melidora macrorrhina*	200–700
Common Paradise Kingfisher	*Tanysiptera galatea*	200–700
Shovel-billed Kookaburra	*Clytoceyx rex*	1,700–2,200
Rufous-bellied Kookaburra	*Dacelo gaudichaud*	200–700
Forest Kingfisher	*Todiramphus macleayii*	1,700
Yellow-billed Kingfisher	*Syma torotoro*	200–700*
Mountain Kingfisher	*Syma megarhyncha*	2,200–2,700*
Azure Kingfisher	*Ceyx azureus*	200–1,200
Little Kingfisher	*Ceyx pusillus*	200
Variable Dwarf Kingfisher	*Ceyx lepidus*	200–1,200
Rainbow Bee-eater	*Merops ornatus*	200*
Blyth's Hornbill	*Rhyticeros plicatus*	200–1,600
Hooded Pitta	*Pitta sordida*	200–700
Red-bellied Pitta	*Erythropitta erythrogaster*	200–700
White-eared Catbird	*Ailuroedus buccoides*	200–1,700
Spotted Catbird	*Ailuroedus melanotis*	2,200
MacGregor's Bowerbird	*Amblyornis macgregoriae*	2,200–3,200
Yellow-breasted Bowerbird	*Chlamydera lauterbachi*	2,200
Papuan Treecreeper	*Cormobates placens*	2,630*
White-shouldered Fairywren	*Malurus alboscapulatus*	1,700–2,200
Orange-crowned Fairywren	*Clytomyias insignis*	2,700–3,200
Red-collared Myzomela	*Myzomela rosenbergii*	1,200–3,700
Rufous-backed Honeyeater	*Ptiloprora guisei*	1,700–3,200
Grey-streaked Honeyeater	*Ptiloprora perstriata*	2,200–3,700
Yellowish-streaked Honeyeater	*Ptiloprora meekiana*	2,500*
Plain Honeyeater	*Pycnopygius ixoides*	200–1,200
Tawny-breasted Honeyeater	*Xanthotis flaviventer*	700–1,200
Meyer's Friarbird	*Philemon meyeri*	200–1,200
Helmeted Friarbird	*Philemon buceroides*	200–700
Long-billed Honeyeater	*Melilestes megarhynchus*	200–2,200
Common Smoky Honeyeater	*Melipotes fumigatus*	1,200–3,700
Olive Straightbill	*Timeliopsis fulvigula*	1,700
Green-backed Honeyeater	*Glycichaera fallax*	700
Black-throated Honeyeater	*Caligavis subfrenata*	1,700–3,700
Obscure Honeyeater	*Caligavis obscura*	1,200
Sooty Melidectes	*Melidectes fuscus*	2,200–3,700
Long-bearded Melidectes	*Melidectes princeps*	3,200–3,700*
Yellow-browed Melidectes	*Melidectes rufocrissalis*	1,700
Belford's Melidectes	*Melidectes belfordi*	2,200–3,700
Forest Honeyeater	*Meliphaga montana*	700–1,200
Mountain Honeyeater	*Meliphaga orientalis*	1,700–2,700*

Mimic Honeyeater	*Meliphaga analoga*	200–1,700
Puff-backed Honeyeater	*Meliphaga aruensis*	200–1,200
Rusty Mouse-warbler	*Crateroscelis murina*	200–1,700
Mountain Mouse-warbler	*Crateroscelis robusta*	1,200–3,700
Bicoloured Mouse-warbler	*Crateroscelis nigrorufa*	1,700–1,790*
Pale-billed Scrubwren	*Sericornis spilodera*	700–1,200
Papuan Scrubwren	*Sericornis papuensis*	1,700–3,200
Grey-green Scrubwren	*Sericornis arfakianus*	1,200–1,700
Large Scrubwren	*Sericornis nouhuysi*	1,700–3,700
Buff-faced Scrubwren	*Sericornis perspicillatus*	1,700–2,700
Yellow-bellied Gerygone	*Gerygone chrysogaster*	200–700
Ashy Gerygone	*Gerygone cinerea*	1,700–3,200
Green-backed Gerygone	*Gerygone chloronota*	200–1,200
Fairy Gerygone	*Gerygone palpebrosa*	200, 1,200
Brown-breasted Gerygone	*Gerygone ruficollis*	1,700–3,200
New Guinea Thornbill	*Acanthiza murina*	2,700–3,700
Goldenface	*Pachycare flavogriseum*	1,200–2,200
Papuan Babbler	*Garritornis isidorei*	200
Loria's Satinbird	*Cnemophilus loriae*	1,700–3,200
Crested Satinbird	*Cnemophilus macgregorii*	2,200–3,700
Yellow-breasted Satinbird	*Loboparadisea sericea*	1,700*
Black Berrypecker	*Melanocharis nigra*	200–1,200
Mid-mountain Berrypecker	*Melanocharis longicauda*	1,700
Fan-tailed Berrypecker	*Melanocharis versteri*	1,700–3,700
Streaked Berrypecker	*Melanocharis striativentris*	1,700, 2,700
Dwarf Longbill	*Oedistoma iliolophus*	700–1,700
Yellow-bellied Longbill	*Toxorhamphus novaeguineae*	200–1,200
Slaty-chinned Longbill	*Toxorhamphus poliopterus*	1,200–2,200
Tit Berrypecker	*Oreocharis arfaki*	2,200–3,700
Crested Berrypecker	*Paramythia montium*	2,700–3,700
Spotted Jewel-babbler	*Ptilorrhoa leucosticta*	1,700–2,700
Blue Jewel-babbler	*Ptilorrhoa caerulescens*	200–1,200
Chestnut-backed Jewel-babbler	*Ptilorrhoa castanonota*	1,200
Yellow-breasted Boatbill	*Machaerirhynchus flaviventer*	200–1,200
Black-breasted Boatbill	*Machaerirhynchus nigripectus*	1,700–3,200
Lowland Peltops	*Peltops blainvillii*	200–700
Mountain Peltops	*Peltops montanus*	1,700–2,700
Black Butcherbird	*Cracticus quoyi*	200
Hooded Butcherbird	*Cracticus cassicus*	200–700
Great Woodswallow	*Artamus maximus*	2,700–3,700
Stout-billed Cuckooshrike	*Coracina caeruleogrisea*	700–2,700*
Boyer's Cuckooshrike	*Coracina boyeri*	200–1,200
White-bellied Cuckooshrike	*Coracina papuensis*	200–1,700
Hooded Cuckooshrike	*Coracina longicauda*	2,700
Common Cicadabird	*Coracina tenuirostris*	200–1,200
Black-shouldered Cicadabird	*Coracina incerta*	200–700
Black Cicadabird	*Coracina melas*	200
Black-bellied Cuckooshrike	*Coracina montana*	1,200–2,700
Golden Cuckooshrike	*Campochaera sloetii*	200–1,200*
Black-browed Triller	*Lalage atrovirens*	200
Black Sittella	*Daphoenositta miranda*	2,700–3,200

Mottled Whistler	*Rhagologus leucostigma*	1,700–2,700
Wattled Ploughbill	*Eulacestoma nigropectus*	2,700
Rufous-naped Whistler	*Aleadryas rufinucha*	1,700–3,700
Crested Pitohui	*Ornorectes cristatus*	1,200
Black Pitohui	*Melanorectes nigrescens*	1,700–2,200
Rusty Whistler	*Pachycephala hyperythra*	200–1,700
Brown-backed Whistler	*Pachycephala modesta*	2,700–3,200
Grey Whistler	*Pachycephala simplex*	700–1,200
Sclater's Whistler	*Pachycephala soror*	1,200–2,200
Regent Whistler	*Pachycephala schlegelii*	1,700–3,700
Rusty Pitohui	*Pseudorectes ferrugineus*	200
Little Shrikethrush	*Colluricincla megarhyncha*	200–2,200
Northern Variable Pitohui	*Pitohui kirhocephalus*	200–1,200*
Hooded Pitohui	*Pitohui dichrous*	700–1,700*
Brown Oriole	*Oriolus szalayi*	200–700
Pygmy Drongo	*Chaetorhynchus papuensis*	200–1,700
Spangled Drongo	*Dicrurus bracteatus*	200–700
Northern Fantail	*Rhipidura rufiventris*	200–1,700
Sooty Thicket Fantail	*Rhipidura threnothorax*	200–1,200
White-bellied Thicket Fantail	*Rhipidura leucothorax*	200–1,200
Black Fantail	*Rhipidura atra*	200–2,700
Friendly Fantail	*Rhipidura albolimbata*	1,700–3,700
Dimorphic Fantail	*Rhipidura brachyrhyncha*	1,200–3,700
Rufous-backed Fantail	*Rhipidura rufidorsa*	200–700
Black Monarch	*Symposiachrus axillaris*	1,200–2,700
Spot-winged Monarch	*Symposiachrus guttula*	200–1,200
Hooded Monarch	*Symposiachrus manadensis*	200
Rufous Monarch	*Monarcha rubiensis*	200
Black-winged Monarch	*Mouarcha frater*	200–1,200
Golden Monarch	*Carterornis chrysomela*	200–1,200
Ochre-collared Monarch	*Arses insularis*	200–1,700
Torrent-lark	*Grallina bruijni*	1,200
Shining Flycatcher	*Myiagra alecto*	200–1,700
Grey Crow	*Corvus tristis*	200–1,700
Lesser Melampitta	*Melampitta lugubris*	2,700–3,700
Blue-capped Ifrit	*Ifrita kowaldi*	1,700–3,700
Crinkle-collared Manucode	*Manucodia chalybatus*	700–1,200
Princess Stephanie's Astrapia	*Astrapia stephaniae*	2,700–3,700
Superb Bird-of-Paradise	*Lophorina superba*	1,700
Magnificent Riflebird	*Ptiloris magnificus*	200–700
Black Sicklebill	*Epimachus fastuosus*	1,200–2,700*
Brown Sicklebill	*Epimachus meyeri*	1,700–3,200*
Magnificent Bird-of-Paradise	*Diphyllodes magnificus*	700–1,700
King Bird-of-Paradise	*Cicinnurus regius*	200–700
Lesser Bird-of-Paradise	*Paradisaea minor*	200–1,200
Ashy Robin	*Heteromyias albispecularis*	1,200–1,700
Black-sided Robin	*Poecilodryas hypoleuca*	200–1,200
Black-throated Robin	*Poecilodryas albonotata*	2,200–3,200
White-winged Robin	*Peneothello sigillata*	2,700–3,700
Slaty Robin	*Peucothello cyanus*	1,700–2,700
White-rumped Robin	*Peneothello bimaculata*	700–1,700

White-faced Robin	*Tregellasia leucops*	200–1,700
White-eyed Robin	*Pachycephalopsis poliosoma*	1,200–1,700
Torrent Flyrobin	*Monachella muelleriana*	200
Canary Flyrobin	*Microeca papuana*	1,700–3,200
Yellow-legged Flyrobin	*Microeca griseoceps*	1,200
Olive Flyrobin	*Microeca flavovirescens*	200–1,200
Garnet Robin	*Eugerygone rubra*	1,700–3,700
Lesser Ground Robin	*Amalocichla incerta*	1,700
Pacific Swallow	*Hirundo tahitica*	200–2,200
Island Leaf Warbler	*Phylloscopus maforensis*	1,200–2,200
Black-fronted White-eye	*Zosterops minor*	200–1,200
Papuan White-eye	*Zosterops novaeguineae*	1,700–2,700
Metallic Starling	*Aplonis metallica*	200–700
Singing Starling	*Aplonis cantoroides*	200
Yellow-faced Myna	*Mino dumontii*	200–700
Island Thrush	*Turdus poliocephalus*	2,700–3,700
Pied Bush Chat	*Saxicola caprata*	2,200
Red-capped Flowerpecker	*Dicaeum geelvinkianum*	200–2,200
Black Sunbird	*Leptocoma sericea*	200–1,200
Olive-backed Sunbird	*Cinnyris jugularis*	200–1,700
Streak-headed Mannikin	*Lonchura tristissima*	200
Blue-faced Parrotfinch	*Erythrura trichroa*	1,700–3,700
Hooded Mannikin	*Lonchura spectabilis*	2,200
Alpine Pipit	*Anthus gutturalis*	3,200–3,700
Mountain Firetail	*Oreostruthus fuliginosus*	3,700